WHAT IS CLAIMED IS:

1   1. A method of preventing data loss in a magnetic disk device where a magnetic

2   head writes data on concentric tracks on a surface of a magnetic disk, the tracks including a first

3   plurality of first-parity-numbered tracks and a second plurality of second-parity-numbered tracks

4   interleaved with the first plurality of first-parity-numbered tracks, the method comprising:

5   maintaining a first set of one or more first-parity-track counters and a second set

6   of second-parity-track counters regarding write operations on first-parity-numbered tracks and

7   second-parity-numbered tracks; and

8   in response to a command to write data to a given first-parity-numbered track,

9   determining, based at least in part on values of counters in the first and

10   second sets, whether a criterion is met,

11   only if the criterion is met, reading data from a second-parity-numbered

12   track, and

13   updating a counter in the first set in a manner that in at least some instances

14   depends on whether the criterion is met.

1   2. The method of claim 1 wherein:

2   the first and second pluralities of tracks are located in a disk area and constitute a

3   fraction of a total number of tracks on the surface of the magnetic disk;

4   the method further comprises maintaining respective first and second additional

5   sets of counters used to prevent data loss in an additional plurality of first-parity-numbered tracks

6   interleaved with an additional plurality of second-parity-numbered tracks located in a different

7   disk area.

1   3. The method of claim 1 wherein:

2   the first and second sets of counters each contain a single counter;

3   the criterion is that

4   the counter in the second set is non-zero, and

5   the counter in the first set has reached a threshold.

6   4. The method of claim 1 wherein:

7   the criterion is that

8   at least one second-parity-numbered track have been written, and

9   the number of writes to first-parity-numbered tracks has reached a

10   threshold.

1   5. The method of claim 1, and further comprising:

2   if data is read from a second-parity-numbered track, determining a number of

3   retries necessary for reading the data; and

4   if the number of retries reaches a threshold, writing the data read from one or

5   more second-parity-numbered tracks to one or more second-parity-numbered tracks.

1   6. The method of claim 5 wherein, if data is written to second-parity-numbered

2   tracks, updating a counter in the first set includes setting the counter to a value signifying a

3   single write to a first-parity-numbered track.

1   7. A method of preventing data loss in a magnetic disk device where a magnetic

2   head writes data on concentric tracks on a surface of a magnetic disk, the tracks including a

3   plurality of first-parity-numbered tracks interleaved with a plurality of second-parity-numbered

4   tracks, the method comprising:

5   storing tracking information regarding writes to first-parity-numbered tracks and

6   second-parity-numbered tracks;

7   in response to a command to write data to a given first-parity-numbered track,

8   determining whether a criterion specifying risk to data on a second-parity-numbered track is met;

9   and

10   if the criterion is met,

11   reading data from one or more second-parity-numbered tracks, and

12   storing the data, so read.

1   8. The method of claim 7, and further comprising:

2   determining a number of retries required for reading the data from second-parity-

3   numbered tracks; and

4   if the number of retries reaches a threshold, writing the stored data read from the

5   second-parity-numbered tracks to the second-parity-numbered tracks.

1   9. A magnetic disk device comprising

2   a magnetic disk for having a surface;

3   a magnetic head for writing or reading the data on or from said surface of said

4   magnetic disk; and

5   a write and read circuit, connected to said magnetic head, for causing said head to

6   write or read data;

7   the data being written on concentric tracks on said surface of said magnetic disk,

8   said tracks including a first plurality of first-parity-numbered tracks and a second plurality of

9   second-parity-numbered tracks interleaved with the first plurality of first-parity-numbered tracks;

10   a first set of one or more first-parity-track counters;

11   a second set of one or more second-parity-track counters;

12   control circuitry that accesses and updates said first and second sets of counters,

13   said control circuitry being configured to respond to a command to write data to a given first-

14   parity-numbered track by

15   determining, based at least in part on values of counters in said first and

16   second sets, whether a criterion is met,

17   only if the criterion is met, reading data from a second-parity-numbered

18   track, and

19   updating a counter in said first set in a manner that in at least some

20   instances depends on whether the criterion is met.

1   10. The magnetic disk device of claim 9 wherein:

2   the first and second pluralities of tracks are located in a disk area and constitute a

3   fraction of a total number of tracks on said surface of said magnetic disk;

4   the magnetic disk further comprises an additional plurality of first-parity-

5   numbered tracks and an additional plurality of second-parity-numbered tracks interleaved with

6   the first plurality of first-parity-numbered tracks, said additional pluralities of tracks being

7   located in a different disk area;

8   the magnetic disk device further comprises first and second additional sets of

9   counters; and

10   said control circuitry further accesses and updates said additional first and second

11   sets of counters, and is configured to respond to a command to write data to a given first-parity-

12   numbered track in the different disk area by

13   determining, based at least in part on values of counters in said first and

14   second additional sets, whether a criterion is met,

15   only if the criterion is met, reading data from a second-parity-numbered

16   track in said different disk area, and

17   updating a counter in said first additional set in a manner that in at least

18   some instances depends on whether the criterion is met.

1   11. A magnetic disk device comprising:

2   a magnetic disk for recording data;

3   a magnetic head for writing or reading the data on or from the magnetic disk; and

4   a write and read circuit, connected to the magnetic head, for writing or reading the

5   data;

6   wherein the data is written or read to or from a plurality of tracks in the form of

7   concentric circles disposed on the magnetic disk; and

8   wherein the number of writes of data on a given track is acquired and it is

9   detected that the number of writes reaches a predetermined number, and

10   based on the detection, data on tracks adjacent to the given track is read out once

11   and, then, the read-out data is rewritten to the adjacent tracks.

1   12. A magnetic disk device comprising:

2   a magnetic disk for recording data;

3   a magnetic head for writing or reading the data on or from the magnetic disk; and

4   a write and read circuit, connected to the magnetic head, for writing or reading the

5   data;

6   wherein the data is written or read to or from a plurality of tracks in the form of

7   concentric circles disposed on the magnetic disk; and

8   wherein all tracks on the magnetic disk are divided into a plurality of areas,

9	the number of writes of data on even-numbered physical tracks in the divided
10	areas is acquired and it is detected that the number of writes reaches a predetermined number,
11	and
12	based on the detection, data on odd-numbered physical tracks in the divided areas
13	is read out once and, then, the read-out data is rewritten on the odd-numbered tracks.

1	13. A magnetic disk device comprising:
2	a magnetic disk for recording data;
3	a magnetic head for writing or reading the data on or from the magnetic disk; and
4	a write and read circuit, connected to the magnetic head, for writing or reading the
5	data;
6	wherein the data is written or read to or from a plurality of tracks in the form of
7	concentric circles disposed on the magnetic disk; and
8	wherein all tracks on the magnetic disk are divided into a plurality of areas,
9	the number of writes of data on odd-numbered physical tracks in the divided areas
10	is acquired and it is detected that the number of writes reaches a predetermined number, and
11	based on the detection, data on even-numbered physical tracks in the divided
12	areas is read out once and, then, the read-out data is rewritten on the even-numbered tracks.

1	14. A magnetic disk device according to claim 12, wherein, when the read-out
2	data is rewritten on the odd-numbered tracks, the number of writes on the even-numbered
3	physical tracks is cleared.

1	15. The magnetic disk device of claim 13, wherein, when the read-out data is
2	rewritten on the even-numbered tracks, the number of writes on the odd-numbered physical
3	tracks is cleared.

1	16. The magnetic disk device of any one of claims 11, 12, 13, 14, or 15 wherein,
2	when data is written on the tracks, the data is written on alternate physical tracks and every other
3	track is skipped and, after the data is written on half of all the tracks, the data is written on the
4	skipped tracks.

1   17. The magnetic disk device of claim 11 wherein, when it is detected that the
2 number of writes reaches the predetermined number, the data to be rewritten is read and, then, if
3 the number of retry for the data reaches a predetermined value, the data is rewritten.

1   18. The magnetic disk device of claim 12 wherein, when it is detected that the
2 number of writes reaches the predetermined number, the data to be rewritten is read and, then, if
3 the number of retry for the data reaches a predetermined value, the data is rewritten.

1   19. The magnetic disk device of claim 13 wherein, when it is detected that the
2 number of writes reaches the predetermined number, the data to be rewritten is read and, then, if
3 the number of retry for the data reaches a predetermined value, the data is rewritten.

1   20. The magnetic disk device of claim 14 wherein, when it is detected that the
2 number of writes reaches the predetermined number, the data to be rewritten is read and, then, if
3 the number of retry for the data reaches a predetermined value, the data is rewritten.

1   21. The magnetic disk device of claim 15 wherein, when it is detected that the
2 number of writes reaches the predetermined number, the data to be rewritten is read and, then, if
3 the number of retry for the data reaches a predetermined value, the data is rewritten.

1   22. The magnetic disk device of claim 16 wherein, when it is detected that the
2 number of writes reaches the predetermined number, the data to be rewritten is read and, then, if
3 the number of retry for the data reaches a predetermined value, the data is rewritten.